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Simulation Based Decision Framework for Hybrid Layout Production Systems under Disruptions

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Abstract: In a hybrid layout production system under uncertainties, making strategic decisions becomes crucial and demanding with increase in complexity of the system. Advent of Industry 4.0 lead to development of technologies such as smart factories, simulation, cloud, cyber physical systems which uses digital twins for making informed strategic decisions in a factory. This paper proposes a decision-making framework for a multi-product hybrid layout production system under stochastic disruptions using a simulation model. Simulation model will act as a digital twin of the physical system which helps to proactively visualize and analyze several key performance parameters of the system and make informed decisions. Objective of this paper is to identify the best sequence from pre-defined sequences for jobs which maximize profit, throughput, and minimize cost, and make-span. Several experimentation cases are developed to analyze performance of the system under different scenarios of disruptions and make strategic decisions such as investing in new machines, prioritizing products, and rescheduling of products.

Keywords: Industry 4.0, Decision-making, Simulation Model